NONPOINT SOURCE PROGRAM ANNUAL REPORT

Delaware

2011

DELAWARE DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

Nonpoint Source Program

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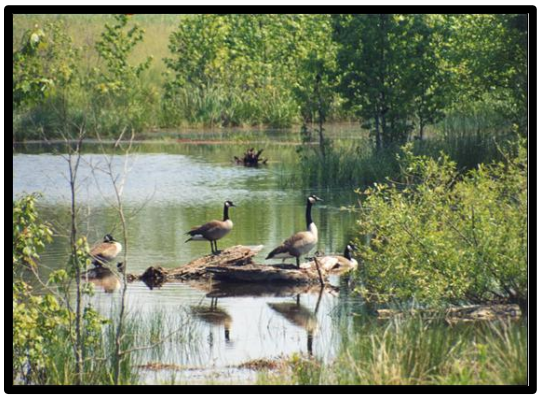

DELAWARE NPS NONPOINT SOURCE PROGRAM

The Delaware Nonpoint Source Program administers a competitive grant made possible through Section 319 of the Clean Water Act. The grant provides funding for projects designed to reduce nonpoint source (NPS) pollution in Delaware. NPS pollution may be defined as any pollution that originates from a diffuse source (such as an open field or a road) and is transported to surface or ground waters through leaching or runoff. Reduction of NPS pollution may often be achieved through incorporation of specific best management practices (BMPs) into project workplans. Projects may target any source of NPS pollution, but most frequently involve agriculture, silviculture, construction, marinas, septic systems, and hydromodification activities.

In addition to funding projects that achieve reductions in NPS pollution, the Delaware NPS Program is committed to addressing the issue through educational programs, publications, and partnerships with other organizations working to reduce NPS pollution in Delaware.

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I. The Delaware NPS Program

As part of the Delaware Department of Natural Resources and Environmental Control, the Delaware NPS Program is committed to addressing the issue of nonpoint sources pollution as it affects Delaware's numerous waterbodies. Efforts will include grant funding, education, outreach, and partnerships with other organizations working together to reduce nonpoint sources pollution in Delaware.

II. NPS Program Funding

Nonpoint Source (NPS) pollution constitutes the nation's largest source of water quality problems. Approximately 40 percent of the United States rivers, lakes, and estuaries surveyed to date are not clean enough to meet basic uses such as fishing or swimming due to NPS pollution.

To counter the ever expanding NPS problem, Congress established the NPS Pollution Management Program under Section 319 of the Clean Water Act (CWA) in 1987. This program provides states with grants to implement NPS pollution controls to achieve goals that are described in NPS pollution management program plans.

On August 4, 1988, Delaware's original (NPS) Program was approved by the Environmental Protection Agency (EPA) making it one of the first programs in the nation to comply with Section 319 of the CWA. Using CWA Section 319 funding, Delaware's NPS Program administers a competitive grant program. The grant provides funding for projects designed to reduce NPS pollution in Delaware's impaired waterbodies. Reduction of NPS pollution is most often achieved through incorporation of specific best management practices (BMPs) into project workplans. Whenever possible, funds are focused in sub-watersheds where NPS control activities are likely to have the greatest positive impact. Funded restoration activities are implemented using the most effective measures and practices available in order to achieve water quality improvements. Eligible types of management program implementation activities include the following:

- Non-regulatory NPS reduction programs
- Technical assistance
- Financial assistance
- Education
- Training
- Technology transfer
- Demonstration projects

Proposals are requested annually, reviewed, evaluated and prioritized, and those which are determined to meet specified requirements are eligible for funding. At least 40 percent of the overall project cost must be represented by non-federal matching funds.

III. Delaware NPS Issues

More than 90 percent of Delaware's waterways are considered impaired. The state's list of impaired waters, filed with the EPA, includes 377 bodies of water that suffer from 11 different impairments, the most common of which are NPS related pollutants including pathogens and nutrients (nitrogen and phosphorus). Most impairments come from nonpoint sources, which are harder to control. As Delaware is a groundwater driven state, removing NPS pollutants become an even harder problem to solve. Due to the rate of groundwater travel through the system, many NPS pollutants entering the systems up to 30 years ago are just now entering surface water bodies today. As such, the effectiveness of agricultural BMPs placed in 2009 will not be realized until much further in the future.

"Impaired waters" are polluted waters. More technically, they are waters that do not meet water-quality standards for their designated uses, such as recreation, fishing, or drinking. Impaired waters could be suffering from excess nutrients, low dissolved oxygen, toxins, bacteria, heat, or any combination of these problems.

Reduction of nonpoint sources of pollution is achieved through the incorporation or installation of specific best management practices (BMPs) addressing agriculture, silviculture, construction, septic systems, and hydromodification activities. To encourage and support the BMP installation, the NPS Program administers a competitive grant program currently made possible through Section 319 of the Clean Water Act. While this federal financial support has proven successful in complementing Delaware's NPS efforts, the NPS Program is currently seeking additional finances to expand our activities to more systematically address Delaware's NPS concerns.

Additional roles and responsibilities of the NPS Program include geospatial BMP tracking and reporting, management of the agricultural State Revolving Fund Program, support for developing Pollution Control Strategies, and watershed plan development and/or coordination.

IV. Vision and Mission

The Department of Natural Resources and Environmental Control envisions a Delaware that offers a healthy environment where people include a commitment to the protection, enhancement and enjoyment of the environment in their daily lives; where Delawareans' stewardship of natural resources ensures the sustainability of these resources for the appreciation and enjoyment of future generations; and where people recognize that a healthy environment and a strong economy support one another.

It's the mission of the Delaware Department of Natural Resources and Environmental Control to protect and manage the state's vital natural resources, protect public health and safety, provide quality outdoor recreation and to serve and educate the citizens of the First State about the wise use, conservation and enhancement of Delaware's Environment.

The Nonpoint Source Management Program is a dynamic and open-ended program intended to facilitate and promote statewide efforts to manage nonpoint source pollution. The following priorities will guide this program:

1. The NPS Program will support the identification and quantification of those problems that are caused specifically by nonpoint source pollution through assessment updates.
2. The NPS Program will be implemented and updated to realistically reduce nonpoint source pollution in a cost-effective manner.
3. The NPS Program will address nonpoint source pollution through a program that balances education, research, technical assistance, financial incentives, and regulation.
4. The NPS Program will follow a non-degradation policy in areas where surface and ground waters meet state water quality standards and a policy to realistically improve water quality in areas that do not meet these standards.
5. The NPS Program will continue to use the coordinated approach for implementation and maintain an open ended framework to incorporate new initiatives and support interactive approaches based on the effectiveness of existing policies and implementation mechanisms.
6. The NPS Program will support the development and implementation of Watershed Restoration Action Strategies (WRAS)/Pollution Control Strategies (PCS) for watersheds of identified impaired or threatened waters in accordance with the Unified Watershed Assessment List.

In Delaware, the lead agency for the development and implementation of the Nonpoint Source (NPS) 319 Program is the Department of Natural Resources and Environmental Control (DNREC), Division of Watershed Stewardship.

V. Executive Summary

This report documents the activities and highlights of the State of Delaware, Nonpoint Source (NPS) Program during the 2011 calendar year. The NPS Program administers a competitive grant made possible through Section 319 of the Clean Water Act. The grant provides funding for projects designed to reduce nonpoint source NPS pollution in Delaware. Reduction of NPS pollution is most often achieved through incorporation of specific best management practices (BMPs) into project workplans. Proposals are reviewed and evaluated, and those which are determined to meet specified requirements are eligible for funding. At least 40 percent of the overall project cost of all projects must be represented by non-federal matching funds.

Although Delaware's surface water quality may not have significantly changed over the past several years, through the Pollution Control Strategies development process, there have been many improvements made in watershed assessment and planning approaches and methodologies. Public support and involvement will prove the key in the successful implementation of any strategy that is developed. Delaware's Nonpoint Source Program will continue to work with our partners in 2011 and beyond to make progress towards meeting the State's water quality goals. Additionally, the NPS Program is evaluating measures to demonstrate success in lieu of improvements as steady state water quality certainly signifies levels of success in spite of an ever-changing Delaware setting.

In 2011, projects funded through the Delaware's NPS Program embarked on many water quality improvement activities including further support of the stream restoration projects and agricultural BMP implementation projects.

Additionally, routine and ongoing projects made great strides during the year and proved, once again, successful NPS pollution reduction strategies. Examples of the routine funded activities include the Nutrient Relocation Program and the Kent and Sussex County Conservation District Planners.

Projects highlighted in the 2011 NPS Annual Report include the following:

- Sussex County Conservation District – Conservation Planners

During the 2011 Calendar year, Sussex County Conservation District Planners worked with area farmers to encourage the installation of agriculture best management practices and partnered with the USDA's Natural Resources Conservation Service in developing conservation plans, nutrient management plans and Environmental Quality Incentive Program (EQIP) contracts. In 2011, the SCD expended nearly $900,000 in conservation cost-share funds. This included payments for cover crops, three heavy use area protection pads, twelve animal mortality structures, two vegetative shoreline stabilization projects, and a wildlife habitat pond.

- Kent County Conservation District – Conservation Planners

Kent County Conservation District Planners worked with Kent County Farmers and provide nutrients management planning, conservation planning and encourage the installation and/or adoption of agricultural Best management practices. The State of Delaware General Assembly provided $400,000 in cost share funds, which were utilized by different cooperating landowners. Projects implemented emphasized water quality, water management, and erosion/sediment control. Funds were allocated for the practices below:

BMP	Number	Unit
Cover Crops	17,644.39	Acres

- Nutrient Relocation Program

In 2011, the Nutrient Relocation Program accounted for the transportation of 3.6 million pounds of total nitrogen and 2.6 million pounds of phosphorus as phosphate out of Delaware's priority watersheds. If that tonnage had been applied to the source farm rather than relocated**,** significant nitrogen and phosphorus could have potentially entered Delaware's surface waters.

- SRF Agriculture Loan Program

In 2011, the State Revolving Loan fund assisted landowners in implementing BMPs by providing a low interest loan for the construction for certain conservation practices and BMP installation in the amount of $51,520.

- Wetland and Stream Restoration Projects

In 2011, Wetland and Stream Restoration projects initiated and/or completed include the following:

  - Webber Farm Wetland Restoration
  - University of Delaware – Stroud Pasture Wetland Restoration
  - Schwartz Property - Wetland Construction
  - Dashell Tract – Tax Ditch Modification
  - Hanes Ditch – Tax Ditch Modification
  - Avery Road – Small Drainage Modification
  - Blackbird – Wetland Restoration

- Stream & Corridor Enhancement Program

In 2011, Stream and Riparian Corridor Enhancement Program projects included the following:

- **Dover Silver Lake Park Stream Restoration Site –** Construction of a regenerative stormwater conveyance system for the City of Dover's Washington Street drainage area and to restoration of approximately 320 feet of stream bank along the St. Jones River below the spillway at Dover's Silver Lake Park.
- **Stella Ellis-** removed from consideration
- **Ham Run Stream Restoration Site-** The Ham Run stream restoration project involves a 400–500 feet reach of Ham Run, a tributary to Red Clay Creek near the intersection of Duncan Road and Greenbank Road.
  Hickory Spring Road- Final design plans are complete and permits issued to construct a project where the homeowner would like to increase the depth of the pond by removing sediment that has accumulated behind a dam.
  DelCastle Technical High School- Representatives from DNREC's Division of Watershed Stewardship and the Natural Resources Conservation Service (NRCS) met with Delcastle Technical High School faculty members and discussed a potential stream and wetland habitat restoration project on the school property located along Hershey Run near Marshallton.
  Blackbird-removed from consideration
  Upper Christina (West Branch)- This site has expanded to a 3,000 foot reach of degraded stream along the upper Christina River west of Newark, Delaware. A request for Qualifications/Letter of Interest was issued and subsequent contractor selected. Plans are anticipated to be completed by August 2011.

- Pollution Control Strategies – Project Implementation

In 2011, the PCS Project Implementation embarked on a wide array of water quality improvement projects. Many of the activities were targeted by the Tributary Action Teams (TAT) formed to draft and implement the Pollution Control Strategies being developed in response to the adopted total maximum daily loads. Funding of many *2011 Highlights* identified

were made possible through NPS Program funding provided to DNRECs Watershed Assessment Section.

VI. Highlighted Efforts

i. Sussex County Conservation District - Conservation Planners 2011

Five Conservation Planners working for the Sussex County Conservation District are funded through a Section 319 Nonpoint Source Pollution grant and through base funding with the state of Delaware. The agricultural conservation staff works with the farming community providing nutrient management planning, cost-share funding for agricultural best management practices, and partnering with the USDA's Natural Resources Conservation Service in developing conservation plans and Environmental Quality Incentive Program (EQIP) contracts. During 2011, the District planners made 1,335 contacts with farmers and landowners throughout Sussex County. Sussex County has a high concentration of poultry operations and the District is challenged with keeping our groundwater clean. The District's client base is diverse with a large influx of Hispanics, Indians, and Asians to the area, with many raising poultry and proving to be excellent cooperators. The District also partners with Delaware's Department of Natural Resources and Environmental Control's (DNREC) Division of Watershed Stewardship by providing important information about the conservation efforts throughout the county.

2011 Highlights:

- In 2011, the SCD expended nearly $900,000 in conservation cost-share funds. This included payments for cover crops, three heavy use area protection pads, twelve animal mortality, two vegetative shoreline stabilization projects, and a wildlife habitat pond.

Cover Crop

The Sussex Conservation District provides cost-share assistance to farmers to plant a winter cover crop. In 2011 the District paid $40 per acre for cover crop that was planted before October 1, and $30 an acre for cover crop that was planted before October 31. Farmers/Landowners can plant rye, wheat, barley, oats, annual rye grass, triticale, clover, vetch, forage radishes, forage turnips, or rape. Radishes and turnips were just added to menu of approved crop species. The forage turnips and radishes are both highly efficient, similar to rye. Farmers/Landowners are not allowed to apply commercial or animal fertilizer on a field that is intended to receive a cover crop incentive payment. Cover crop payments are divided up into two payments; half a payment is made to the farmer after the crop has been planted, and the other half is paid after the crop has been destroyed.

Farmers/landowners were allowed to harvest their cover crop. All restrictions for the regular program still apply. The farmer/landowner harvesting the crop will not receive a second payment on that acreage; however, they will not be required to repay the first payment.

In an effort to determine what incentive rate it would take to get farmers/producers to plant rye early (prior to October 1), the SCD instituted a pilot program in the Broad Creek Watershed. This pilot program would pay farmers $60 per acre with a larger cap to plant rye seed on corn ground that has received manure or other fertilizers. All other cover crop planting and

destruction requirements still applied. No harvesting was allowed in the pilot project. The weather in the Broad Creek Watershed was very wet in the late summer and fall, preventing or limiting access to farm fields. In 2012, the SCD will continue to find ways to increase the early planting of rye seed.

Planting a cover crop has a very positive impact on the environment. The crop takes up excess nutrients, improves ground water, and helps prevent soil erosion.

2011 Highlights:

- The Sussex Conservation District enrolled over 131,000 acres requesting nearly $1 million in cost-share assistance for the regular cover crop program, and enrolled over 3,000 acres requesting over $183,000 in the Broad Creek Pilot Program. Nearly 33,000 acres were planted which equals nearly $800,000 in cost-share for the regular cover crop program and nearly 1,200 acres were planted equaling nearly $77,000 in cost-share for the Broad Creek Pilot Program. Actual acres planted decreased by 1,567 acres - a 9% decrease over the acres planted in 2010. This year SCD continued placing advertising signs in cover crop fields. The signs say "Delaware Cover Crop Participant, Protecting our Bays and Environment." The signs are placed in fields along well traveled roads and have received a lot of positive feedback on the signs.

Presidedress Nitrogen Testing

The Sussex Conservation District provides pre-sidedress nitrogen tests to local farmers free of charge. This test helps estimate the available nitrogen in the soil for manured soils. The estimate is used to make a nitrogen recommendation to the farmer for a realistic yield goal for his/her corn crop. PSNTs take into consideration many factors in determining the need for additional nitrogen. Some of the variables include yield goal, type, rate, and timing of manure application, prior fertilizer application, tillage method on the farm, and irrigation. With all of these factors combined it allows the grower to see how much additional nitrogen is needed to produce the targeted yield goal. In 2011, the Sussex Conservation District completed 136 tests on 5,018 acres.

As well as PSNTs, the Sussex Conservation District also provides soil sampling to local farmers as an integral part of their nutrient management plan. Samples are taken every three years. The planners take 15 to 20 cores per sample and the samples are sent to AgroLab and the University of Delaware Soils Lab. The results are reviewed with the farmer along with recommendations for nitrogen, phosphorus, potash, and lime. The recommendations are based on soil capability, use of animal manures, and a realistic yield goal for the crop. Soil sampling helps the farmer maintain his lime and nutrient levels which provides a more environmentally friendly method to farming.

2011 Highlights:

- SCD Conservation Planners tested 136 fields using pre-sidedress nitrogen tests, covering 5,018 acres in Sussex County. They also completed 31 nutrient management plans on 7,556 acres and 83 animal waste management plans.

BMP's	State	EQIP	Total
Manure Shed	0	26	**26**
Composter	0	17	**17**
Poultry Windbreak	0	20	**20**
Ag Waste System	0	1	**1**
Irrigation System	0	25	**25**
HUAP	3	352	**355**
Poultry Litter Amendment	0	63	**63**
Wildlife Ponds	1	0	**1**
Vegetative Shoreline	1	0	**1**

Activities	Total	Acres
Landowner Contacts	1,335	N/A
Conservation Plans	91	8,444
Nutrient Management Plans	31	7,556
Animal Waste Plans	83	N/A
FY11 Cover Crop Enrolled	187	131,314
FY11 Cover Crop Planted	N/A	32,875
Broad Creek Cover Crop Enrolled	17	3,064
Broad Creek Cover Crop Planted	N/A	1,281
Soil Samples	271	5,733
PSNT's	136	5,018
Manure Samples	71	N/A

Dollars Expended			
State	**EQIP**	**Cover Crop**	**Broad Creek**
$ 64,315	$3,734,200	$ 790,437	$38,415

Outreach and Education

Every year, the Sussex Conservation District holds an event to honor those conservation minded individuals in the County. During odd years, we hold a dinner for our district cooperators. There have been as many as over 250 farmers, partners, and employees in attendance. During even years, we hold a tax ditch breakfast which brings together the officers of the tax ditch organizations to discuss issues that are important to them. We have well over 100 people in attendance for this event also.

The Sussex Conservation District attends several events throughout the year to educate the public about conservation. Some of these events include the University of Delaware Coast Day, Delaware Solid Waste Authority Earth Day, and the Cooperators' Dinner. The District, in cooperation with the conservation partnership, also has a display at the Delaware State Fair. Information about the District and our programs are distributed at these events.

Each year the Sussex Conservation District staff assists with the Delaware Envirothon. The Envirothon provides student with an integrated approach to exploring five natural resource categories. It tests their creativity, analytical thinking, and team building skills in a competitive format. The Envirothon is a "day-in-the-field" where teams visit testing stations for problem solving opportunities in aquatic ecology, forestry, oral presentation, soil/land use, wildlife, and a current environmental issue. The 2011 Delaware Envirothon was held at Blackbird Creek Reserve in New Castle County. Wilmington Charter Team 1 was the winner and went on to place 16th at the Canon National Envirothon in New Brunswick, Canada.

2011 Highlights:

- On December 1, the SCD held the biannual Cooperators' Dinner at the Bridgeville Fire Hall. The breakfast was well attended with 265 people in attendance. Jessica Watson gave a presentation about the history of the Sussex Conservation District and the challenges ahead. The 2009 and 2010 Cooperators of the Year were recognized and honored at the dinner. Clifton Murray of Murray Brothers was the 2009 award recipient, and William Otwell and Son were the 2010 award recipient.

ii. Kent County Conservation District - Conservation Planners

Two Conservation Planners operating at the Kent County Conservation District are funded through a Section 319 Nonpoint Source Pollution grant and through base funding with the state of Delaware. The Conservation Planners work with the farming community providing nutrient management planning, cost-share funding for agricultural best management practices, and partnering with the USDA's Natural Resources Conservation Service in developing conservation plans and Environmental Quality Incentive Program (EQIP) contracts.

Introduction

The Kent Conservation District (KCD) is a governmental subdivision of the State of Delaware authorized by state legislation in Title 7 of the Delaware Code, Chapter 39 and responsible for conservation work within Kent County. In Delaware there is a conservation district in each county. KCD functions are to focus attention on land, water and related resource problems; develop programs to solve the problems; enlist and coordinate help from public and private sources to accomplish the District goals; and increase awareness of the relationship between human activities and the natural environment around us. It is the Board of Supervisors' responsibility to plan and direct the District programs, coordinate the help of governmental agencies, assign priority to requests for conservation technical assistance from private landowners, and serve as a community clearinghouse for information services. The KCD Board of Supervisors meets monthly and all meetings are open to the public.

Much of the Districts' effectiveness is due to their ability to work with local, state, and federal agencies to solve local environmental problems. KCD enters into agreements (memorandums of understanding) with cooperating agencies and organizations that outline the obligations of each party and the assistance available. KCD operations are supported by federal, state and local governments and private individuals. The USDA Natural Resources Conservation Service (NRCS) and the Delaware Department of Natural Resources and Environmental Control

(DNREC) provide technical leadership to KCD. Additional cooperating agencies include: the University of Delaware's Cooperative Extension Service, the USDA Farm Service Agency, the Delaware Department of Agriculture (DDA), and the First State Resource Conservation and Development Council.

KCD receives an annual allocation from the State of Delaware administered through DNREC, which is used to cost-share with landowners for environmentally sound improvements of their land. This funding also provides a portion for personnel and administrative costs to run the program. KCD also receives funding from the state and county government to address the needs of the tax ditch systems within Kent County. Additional funding is received through special conservation grants and equipment rental.

Employees within KCD provide technical, administrative, and clerical support to district programs. At times, Earth Team Volunteers assist with carrying out the District's conservation programs. KCD works directly with farmers, landowners, and municipalities on the following types of challenges: water quality protection; stormwater management; aquifer protection; land use planning; erosion and sediment control on land undergoing development, farmland, critical areas and public lands; flooding problems; wetlands protection; soil survey information; and sustainable agriculture.

Partnerships

The USDA's Natural Resources Conservation Service (NRCS) and Farm Service Agency (FSA) provided technical and financial assistance through a cost-sharing program to cooperating landowners for conservation practices. Cost-sharing through the Environmental Protection Agency (EPA) enabled the District to continue work toward the reduction of non-point source pollution. Funding from the State of Delaware and Kent County Levy Court allowed the continuation of the community drainage program and resource development. The Kent Conservation District is charged under state law with the responsibility to protect and enhance the soil and water resources of the State. It has been given broad authority, the most significant of which is to enlist the aid of state and federal agencies.

Districts were conceived as local bodies to bridge the gap between the landowner and the federal agency charged with protecting the nation's soil resources from erosion – the Natural Resources Conservation Service of the United States Department of Agriculture. The NRCS is a professional organization administering a number of federal soil conservation programs, some through the districts. The team of professionals reaches the landowner through district memorandums of understanding with the USDA and the NRCS. A working relationship has developed that is mutually effective. The presence of USDA-NRCS in Delaware was a result of an initial request by the Conservation Districts.

Much of the Districts' effectiveness is due to the ability to work with local, state, and federal agencies to solve local environmental problems. As previously discussed, Kent Conservation District enters into agreements (memorandums of understanding) with cooperating agencies and organizations that outline the obligations of each party and the assistance available. Kent Conservation District operations are supported by federal, state and local governments and

private individuals. In addition to the USDA-NRCS, DNREC also provides technical leadership to Kent Conservation District.

Additional cooperating agencies include:

- The University of Delaware's Cooperative Extension Service
- The USDA Farm Service Agency
- The Delaware Department of Agriculture (DDA)
- The United States Fish & Wildlife Service
- The First State Resource Conservation and Development Council
- EPA Chesapeake Bay Program
- Delaware Nutrient Management Commission
- National Association of Conservation Districts

Conservation Cost Share Program

2011 Highlights:

- The State of Delaware General Assembly provided $400,000 in cost share funds, which were utilized by different cooperating landowners. Projects implemented emphasized water quality, water management, and erosion/sediment control. Funds were allocated for the practices below:

BMP	Number	Unit
Cover Crops	17,644.39	Acres

The Conservationist Planners completed a total of 412 inspections of installed practices to ensure the practices are working properly and do not need any maintenance.

Conservation Reserve Enhancement Program

This money was used to install conservation practices on marginal cropland to improve water quality and enhance wildlife habitat. A total of 11 contracts were signed on 7 farms.

Cost-share funds in the amount of $42,000 were obligated to cover the estimated costs for establishing the practices. The practices cover 102 acres and are broken down as follows:

BMP	Number	Unit
Hardwood Tree Planting	49.8	Acres
Wildlife Upland Habitat	20.1	Acres
Shallow Water Area for Wildlife	4.7	Acres
Filter Strips	27.4	Acres

Environmental Quality Incentive Program

The total amount of EQIP cost-share funds earned for the year was $1,896,542. Of this funding, $802,503 was used in multiple watersheds for the implementation of the water quality practices listed below:

BMP	Number	Unit
Composters	3	Each
Fencing	2,342	Feet
Heavy Use Area Protection	5	Pads
Irrigation Sprinkler Systems	438	Acres
Irrigation Water Management	2,506	Acres
Nutrient Management	5,083	Acres
Pasteurization (Waste) Treatment	27	Houses
Pest Management	3,822	Acres
Waste Storage Facilities	4	Each
Windbreak / Shelterbelt	6,174	Feet

The remainder of the funding, $1,094,039 was used specifically in the Chesapeake Bay Watershed for the implementation of the water quality practices listed below:

BMP	Number	Unit
Composters	1	Each
Fencing	15,508	Feet
Heavy Use Area Protection	13	Pads
Irrigation Water Management	533	Acres
Nutrient Management	1,800	Acres
Pest Management	2,866	Acres
Waste Storage Facilities	4	Each
Windbreak / Shelterbelt	1,100	Feet
Water Facility	8	Each

Nutrient Management

2011 Results:

- KCD, continued to provide pre-side dress soil nitrate tests (PSNT) to all interested corn growers in Kent County. Use of this test can result in economic savings and reduce the chance of groundwater contamination by nitrates. In 2011, a total of 149 samples were tested covering 5,620 acres. The District's conservationists also worked with cooperators in testing manure as well. Last year the following numbers of manure samples were tested: dairy – 5, and poultry – 16. With the EPA putting heavy pressure on producers falling under a Concentrated Animal Feeding Operation (CAFO), KCD has been presented with the challenge of producing more Comprehensive Nutrient Management

Plans (CNMP's) or animal waste plans for CAFO permits than previous years. The conservationists completed 25 CNMP's and 11 nutrient management plans covering 2,946 acres. The recent push for the Chesapeake Bay Watershed Initiative (CBWI) has the conservationists promoting BMP's such as cover crops within the watershed. This year 96 producers participated in the cover crop program planting a total of 17,756.45 acres, 49 producers and 7,021 acres were in the CBW. KCD will continue to promote BMP's within the CBW.

Education Initiatives & Awards

2011 Highlights:

- The District again supported the Envirothon, a problem-solving, natural resource education program for high school students. The competitive nature of the program motivates students to expand their knowledge of natural resources and realize their responsibility as stewards of our natural resources. The students answer written questions and conduct hands-on investigations of environmental issues in six categories: aquatic ecology, soils/land use, forestry, wildlife, air quality, and a current environmental issue which was salt and freshwater estuaries. Eighteen teams competed in the competition. Kent County teams included Polytech High School Team A, Caesar Rodney High School and Kent County 4-H. Honors for the Kent County teams included the following:

    - Polytech High School Team A: 3rd Place overall – Soils/Land Use, 2nd Place – Wildlife, 2nd Place – Forestry, 3rd Place – Salt/Freshwater Estuaries, 3rd Place

    - Polytech High School FFA: 4th Place overall – Aquatic Ecology, 3rd Place – Wildlife, 3rd Place

    - Kent County 4-H: 6th Place overall – Oral Presentation, 3rd Place

14th Annual Barn Dance

On Friday, September 16, 2011, over 300 guests filled the Dover Building at the Delaware State Fairgrounds for the KCD's 14th Annual Barn Dance. Participants raised $11,659 in net proceeds to support the Delaware Envirothon.

A traditional Barn Dance meal of barbecue pork and chicken was served to the attendees. Volunteer supporters of the Barn Dance prepared delicious side dishes and desserts to round out the meal. Other events of the evening included a silent auction, a live auction by Herb Kenton, and dancing to local DJ G.R. Meyers. Many volunteers helped to serve the meal and beverages, and assisted with photography, the auctions and cleanup. Without the support of the volunteers and community in making the event such a success, KCD would not be able to make such a generous donation to the Delaware Envirothon. The District sincerely appreciates the many volunteers; those who provided financial support; and those who donated auction items, food and other items to the event.

Funds raised will be used by the Delaware Envirothon, a competitive problem-solving, natural resource challenge for high school students, to provide training opportunities throughout the

year, to host the state competition held in the spring, and to send the state winning team to the North American competition.

Outreach Efforts

District staff participated in the following outreach activities in our continuing effort to promote environmental awareness: distributed Soil and Water Stewardship Week materials to local churches, schools and libraries; staffed the Delaware Conservation Partnership display at the Delaware State Fair and Dairy Day at the Hartly Fire Co.; participated in the Science Alliance's "What in the World" career awareness program at four elementary schools; sponsored a conservation poster contest; supplied judges for the National Arbor Day Poster Contest; provided presenters and guides for DNREC's Make-a-Splash Water Festival; picked up trash twice along Honeysuckle Road (a little over four miles) as part of the Adopt-a-Highway program; volunteered in various roles at the Delaware Envirothon; and joined the DNREC Adopt-a-Wetland program, adopting the wetland at the intersection of Governors Avenue and the Puncheon Run River in Dover.

iii. Nutrient Relocation Program

Broiler production continues to be a vital industry on the Delmarva Peninsula. Delaware annually produces approximately 232 million broilers, ranking tenth in the nation among broiler production.

Application of broiler litter to cropland in Delaware has been an important source of crop nutrients over the years, but has also contributed to elevated phosphorus levels in the soil. Application of poultry litter to these farms is regulated by limiting phosphorus applications to the amount that can satisfy crop needs, creating a surplus of poultry litter on those farms that must be disposed of. Many farmers who demonstrate insufficient land or high soil phosphorous levels must find alternative uses for poultry litter. Many businesses have surfaced over the past few years to help manage excess litter. The Relocation Program is an effective solution to excess litter generated in Delaware.

The Relocation Program provides financial reimbursement to farmers, brokers, and trucking businesses for the transportation cost of relocating litter from a Delaware farm to an alternative use project or another farm for land application. The Relocation Program approval process validates eligible senders, receivers, truckers, and alternative use projects. Excess litter continues to be transported for land application throughout Delaware as well as to Maryland, New Jersey, and Virginia. Alternative use projects (such as the Perdue AgriRecycle Plant and mushroom farms) are also essential for managing excess poultry litter.

2011 Highlights:

58,838 tons of excess poultry litter was relocated, for a ten year total of over 820,000 tons. In 2011 33% of the excess litter went to alternative use projects such as the Perdue AgriRecycle in Blades, DE. During 2011 Perdue AgriRecycle

processed over 12,000 tons of Delaware generated poultry manure. The 2011 relocated tons represents an estimated 3.6 million pounds of total nitrogen and 2.6 million pounds of phosphorus as phosphate. If that tonnage had been applied to the source farm rather than relocated**,** a large percentage of these nutrients may have made their way to Delaware's surface waters. This represents a significant load reduction and a bargain from a cost-benefit analysis perspective.

iv. Nutrient Management Planning

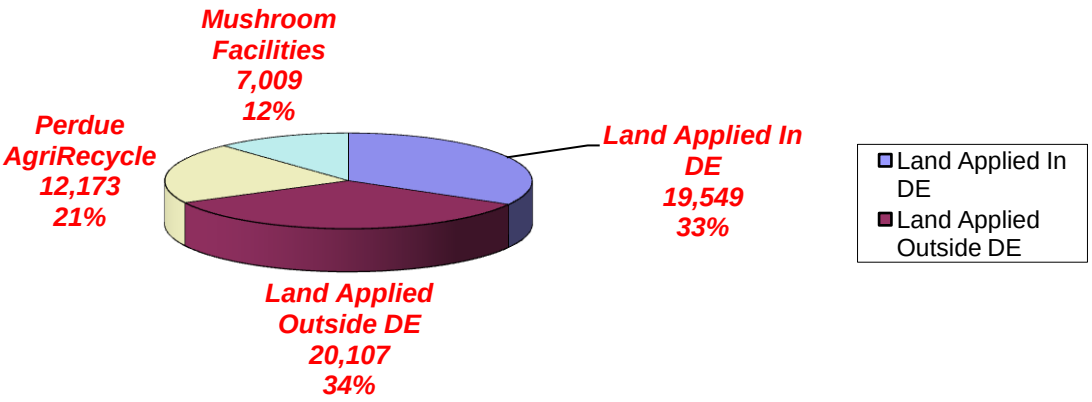
A nutrient management plan is a farmer's "business plan" for nutrients. The more efficiently fertilizers are used on the farm, the fewer nutrients escape to waterways. A plan is developed by a certified nutrient consultant and includes contents such as maps, soil analysis, manure analysis, crop yield goals and a budget for nutrients.

The NPS Program continues the partnership with Delaware Nutrient Management Commission and the three Conservation Districts in providing nutrient management plans to farmers. They depend on private and public nutrient consultants. In 2011, 138 farms and 1 nursery/tree farm representing 84,379 acres were reimbursed at a capped rate for a plan developed by a private consultant. During the same period, Kent and Sussex Conservation Districts assisted farmers statewide by writing nutrient management plans representing over 7,000 acres. During 2011, a total of 286,929 acres were provided with nutrient management plans that are valid until 2012.

Delaware Environmental Stewardship Program

The NPS Program assisted in a Commission partnership with two of the poultry integrators to select and recognize the 2010 environmental stewards. Mountaire Farms Inc., Allen's Family Foods and Perdue Farms, Inc. funded the 2010 stewardship program. The Environmental Stewardship program was established in 2001 to recognize farmers whose stewardship and general farm practices contribute to the conservation of the environment, water quality and farmland. The program recognized growers by evaluating nutrient management, best management practices, farm management, innovation, bio-diversity and wildlife management. The 2009 top award for Delaware Environmental Stewardship was awarded to Frank Robinson of Harrington. Mr. Robinson received a cash award of $1,000, a plaque and a lane sign. Shane Carter of Harrington and Beth Lewis of Laurel were also given awards. Each received $500, a lane sign and a plaque.

2011 Relocation and Alternative Use of Poultry Manure 58,838 Tons



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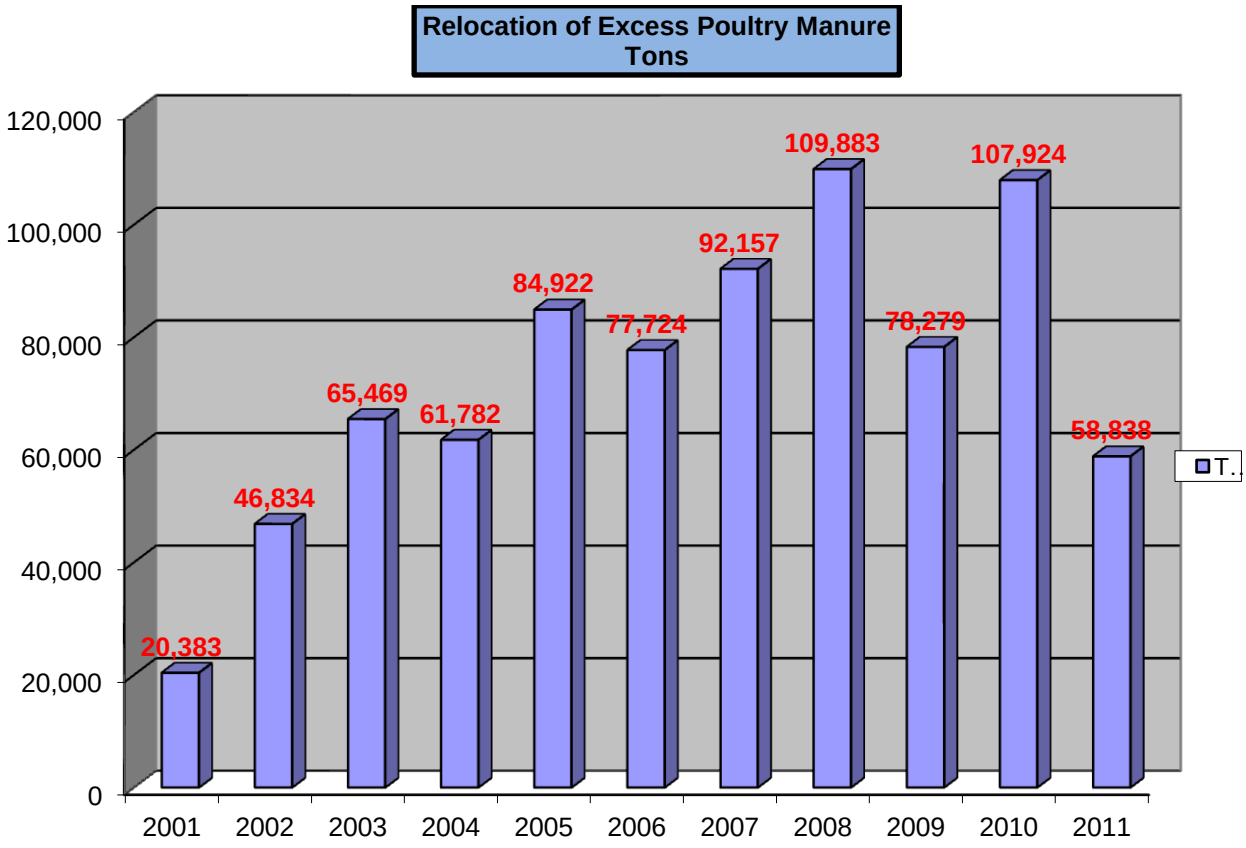
The NPS Program continues the partnership with Nutrient Management Commission and Conservation Districts in providing nutrient management plans to farmers. They depend on private and public nutrient consultants. In 2010, 158 farms, 2 nurseries and 2 golf courses representing 129,235 acres were reimbursed at a capped rate for a plan developed by a private consultant. During the same period, Kent and Sussex Conservation Districts assisted farmers statewide by writing nutrient management plans representing 7,554 acres. Also, 47 farms were assisted with an animal waste management plan. During 2010, a total of 319,279 acres were provided with nutrient management plans that are valid until 2011.



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v. CREP Program Coordinator

Introduction

The Delaware CREP Program was established in 1999 with the designated goals of improving water quality and enhancing wildlife habitat in the coastal plain geographic areas of the Delaware, Chesapeake, and Inland Bays watersheds. The program is voluntary and incentive-

based and pays farmers and landowners attractive incentives for putting their least productive lands under a 10 or 15 year contract that requires the land to be put into the conservation practice the landowner chooses. Landowners can establish forest, native warm-season grasses, or cool season grasses. In return the landowner receives cost-share, annual rental payments, and generous bonus payments.

One of the major requirements to determine eligibility for enrollment in the Delaware CREP Program is the selected agricultural land must be adjacent to ditches, streams or channels that ultimately lead to waterbodies identified as impaired. All of Delaware's waterbodies are identified as impaired per Section 303(d) of the Clean Water Act due to excessive nutrient and bacteria, low dissolved oxygen, degradation of biology and habitat.

Delaware is divided into three counties: New Castle, Kent and Sussex. Streams and man-made channels in New Castle and Kent Counties drain into the Chesapeake and Delaware Bays. Sussex County streams drain into the same bays plus the Inland Bays.

In order to coordinate and maximize assistance provided to voluntary cooperating landowners, a full-time CREP Coordinator is on staff through DNREC's Nonpoint Source (NPS) Program and is funded through a Federal Clean Water Act Section 319 grant allocation.

Program Goals

The initial Delaware CREP Program was signed into agreement on June 2, 1999 by USDA and the Governor of Delaware. The primary goals of the program were to improve water quality and enhance wildlife habitat. Specific areas of the Delaware targeted by this agreement include the coastal plain geographic areas the drain to the Chesapeake Bay, Delaware Bay or the Inland Bays watersheds. The results oriented program was designed to address high-priority conservation issues, such as water quality and loss of critical habitat for wildlife species of concern.

Specifically, as established, the Delaware CREP Program defined the following programmatic goals:

1. Reduce nutrient and sediment loadings to impaired Delaware waterbodies;
2. Meet aquatic temperature and dissolved oxygen criteria necessary to support biology and wildlife;
3. Increase upland wildlife habitat and create wildlife corridors.

The Delaware CREP Program had an initial goal to remove environmentally sensitive or marginal agricultural land from production and enroll the acreage (up to 6,000 acres) in eligible conservation oriented practices. Targeted acreage for the eligible practices, as defined under the Conservation Reserve Program, includes the following:

1. CP21 - Grassed Filter Strips - 3,000 acres
2. CP22 - Riparian Buffers - 1,000 acres
3. CP23 - Wetlands Restoration Floodplain - 500 acres
4. CP3A - Hardwood Tree Planting - 500 acres
5. CP4D - Permanent Wildlife Habitat - 1,000 acres

In 2006, a proposal was submitted to the US Department of Agriculture, Farm Service Agency to expand and enhance the Delaware CREP Program to increase the enrollment area from 6,000 to 10,000 acres and add the following to the list of eligible practices:

- CP9 - Shallow Water Areas for Wildlife
- CP23A - Wetlands Restoration, Non-Floodplain

This CREP Revised Agreement was approved and became operational in 2007.

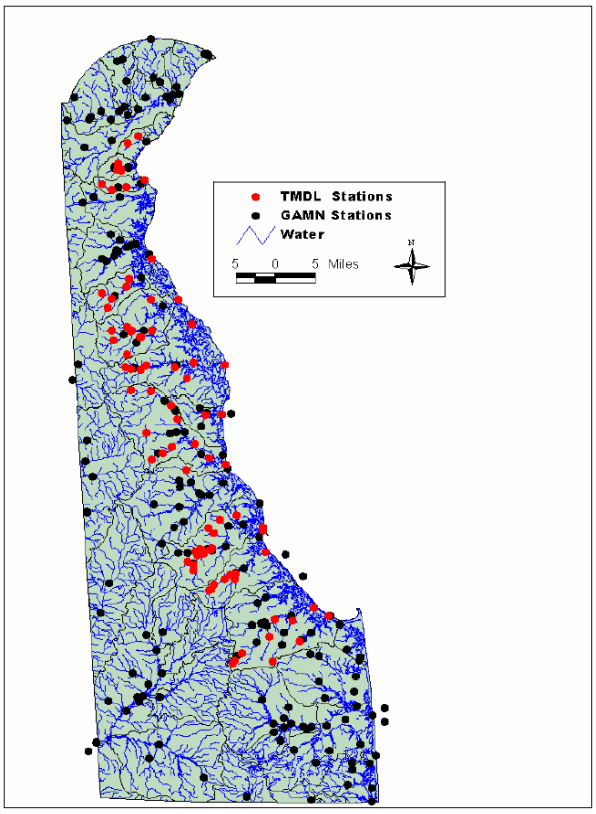
Delaware Goals

Delaware initially set a goal of establishing 6,000 acres of selected practices to meet the goals of the CREP Program. To date over 6,000 acres have been installed under contracts of 10 and 15 year terms. The table found within Appendix (C) summarizes the cumulative CREP practices installed during the calendar years 2001 through 2011. The table found within Appendix (A) lists the cumulative practices installed between 2001 through 2011, watershed, and the financial contributions made by the State and private landowners.

Currently the USDA Farm Service Agency pays 50% of installation costs for CREP practices and the State of Delaware pays 37.5% of the costs. On practices CP21, CP9 and CP4D FSA pays 64% of the incentive payments and Delaware pays 36%. On practices CP22, CP23, CP23A and CP3A FSA pays 73% and Delaware pays 27%.

Education and Outreach

USDA Farm Service Agency and their State partners in Delaware, the Department of Natural Resources and Environmental Control (DNREC) continue to utilize a variety of methods to reach the public with information relating to the Delaware CREP Program.



During 2010, Delaware's CREP Coordinator developed a guide for prospective CREP participation in order to help them understand the process in developing a CREP contract.

Once again DNREC employees manned a booth at the Delaware State Fair in July. They were on hand to answer questions about water quality, the environment and CREP.

In 2007, Delaware's State partners funded the creation of 20 year CRP celebration signs that were placed on participating CREP farms near major highways in each county. These signs remain active and are continually maintained.

Monitoring

While not designed to specifically assess the success of Delaware's CREP Program, Delaware's DNREC maintains two water quality monitoring networks, the General Assessment Monitoring Network (the GAMN), and the Total Maximum Daily Load (TMDL) related monitoring network. There are a total of 263 monitoring stations included in these the two networks, 176 stations are in the GAMN, and 87 stations are in the TMDL network. All stations in the networks are monitored four times per year for a suite of physical and chemical parameters. Some stations in selected watersheds are monitored for up to five key metals for dissolved and total concentrations in the water column.

GAMN stations are considered long term stations whose data is used to do long term trend assessments and support compilation of Watershed Assessment Reports as mandated by the Clean Water Act under Section 305(b). TMDL related monitoring stations are generally in place for one to two years to support data needs for TMDL model development and calibration. Some stations are monitored for sediment concentrations of selected constituents. TMDL related monitoring for watersheds of the Delaware Bay Drainage Basin began in FY 2002 and will be continued and expanded over the next few years.

The purpose of the water quality monitoring program is to collect data on the chemical, physical and biological characteristics of Delaware's surface waters. The information that is collected under the program is used to:

- Describe general water quality conditions in the State;
- Identify long term trends in water quality;
- Determine the suitability of Delaware waters for water supply, recreation, fish and aquatic life, and other uses;
- Monitor achievement of water quality standards;
- Identify and prioritize high quality and degraded waters;
- Support Total Maximum Daily Load Program; and
- Evaluate the overall success of Delaware's water quality management efforts.

Due to the widespread areas of practice installation specific detailed monitoring is currently impractical. However, using calculations developed through the Inland Bays Pollution Control Strategy process an estimate of cumulative CREP reductions by watershed in nitrogen, phosphorous and sediment loads. Estimates are as follows:

Pollutant	***Reduction Units***
Nitrogen	185,209 Pounds/year
Phosphorus	8,263 Pounds/year
Sediment	33,071 Tons/year

These figures demonstrate of the amount of each pollutant that will not reach surface and ground waters as a result of CREP practice installation. Load reductions have been incorporated into the TMDL process, both for loads credited as already reduced and for future reductions from additional implementation.

Program Challenges

Increasing grain prices are influencing many farmers to consider crop production as an alternative to CREP. If grain prices continue to rise and rental rates for crop production lands rises, CREP rental rates might have to increase to remain a viable alternative even on marginal agricultural lands.

Future

CREP partners will continue to enhance out-reach and education efforts to reach farmland owners and operators. One new effort ongoing is working with Public Tax Ditch managers and their constituents to encourage the establishment of grassed filter strips. More grassed filter strips along the many miles of channels in cropland would reduce sediment loads, reduce maintenance costs and aid farmers in meeting their nutrient management and conservation objectives.

Two recent developments in the state should have a positive influence on CREP acres in the coming years. First, Delaware recently submitted a Chesapeake Bay Watershed Implementation Plan in response to Total Maximum Dailey Loads (TMDLs) created by EPA to limit the extent of pollution that may enter the Bay. The Watershed Implementation Plan established a list of recommendations to meet these limitations. A major component of the recommendations is the establishment of stream or corridor buffers including many CREP practices. Second, Delaware recently adopted CAFO regulations that will affect the largest broiler production area in the world. Part of these regulations will include requirements to manage CAFO operations and associated field operations in an environmentally protective manner. Again, stream and corridor requirements are included.

In recent years and coming years expiring CRP and CREP contracts will have a positive effect on stabilizing and increasing CREP acres in Delaware. During the 2011 operating year a total of 8 expiring CRP and CREP contracts were enrolled in the Conservation Reserve Enhancement Program in Delaware totaling 28 acres. During 2011 a total of 21 plans and contracts were completed on 256 acres.

In addition, the CREP coordinator conducted 78 field spot checks in 2011 involving over 1,200 acres of CREP contracts.

2011 CREP Projects

CP3A Acres	CP4D Acres	CP9	CP21 Acres	Total Acres	Rental Cost State	Cost Share State	Delaware Bay Watershed Contracts	Chesapeake Bay Watershed Contracts	Inland Bays Watershed Contracts	Private Contributions
	*3.9			3.9	$244.02	N/A	1			N/A
			*6.1	6.1	$483.12	N/A	1			N/A
	*5.0			5.0	$306.00	N/A	1			N/A
	5.0			5.0	$630.43	N/A			1	N/A
	5.1			5.1	$528.77	$415.13		1		$138.38
	15.7			15.7	$1,968.80	$187.88		1		$62.63
	*6.2		5	11.2	$806.40	$1,204.84		1		$2,888.70
			*11.2	11.2	$806.40	$2,862.66		1		$954.16
	*5.8			5.8	$825.40	N/A	1			N/A
		6.0		6.0	$616.25	$173.62	1			$57.87
49.8				49.8	$11,899.71	$1,643.40		1		$547.80
			*11.3	11.3	$1,620.00	$2,635.79		1		$878.97
			*13.6	13.6	$1,778.40	$3,194.53		1		$1,075.21
	3.8			3.8	$403.56	$45.00		1		$15.00
		*1.0		1.0	$79.20	$87.15		1		$39.25
**-2.4				-2.4				**1		
	**-0.6			-0.6				**1		
			**-26.3	-26.3				**1		
			**-2.9	-2.9				**1		
	**-5.0			-5.0				**1		
47.4	**44.9**	**7.0**	**18.0**	**117.3**	**$22,996.46**	**$12,450.00**	**5**	**9**	**1**	**$6,657.97**

*CREP Expiring Contract Renewed
**Contracts Expired or Canceled

Cumulative Delaware CREP Projects

2001 through 2011

	CP21 Acres	CP9 Acres	CP22 Acres	CP23 Acres	CP4D Acres	CP3A Acres	Total Acres	Rental Cost State	Cost Share State
2001	724.80		40.20	765.00	334.10	530.00	2,115.80	$549,326.77	$160,826.84
2002	320.90		28.40	94.90	158.20	983.50	1,585.90	$434,180.29	$92,639.16
2003	34.90		0.00	37.20	22.10	394.10	488.30	$159,574.58	$24,417.34
2004	94.90		0.00	0.00	32.40	235.00	362.30	$97,578.93	$11,625.13
2005	49.00		0.00	0.00	50.00	192.40	277.50	$77,835.26	$16,718.85
2006	13.90		1.1	15.5	12.9	122.2	165.6	$46,915.02	$10,382.77
2007	1.1	2.0	0.00	8.6	17.2	203.1	238.5	$64,948.50	$12,116.67
2008	46.6	15.2	3.3	0.00	48.0	32.6	106.1	$23,337.05	$12,137.99
2009	6.5	44.0	4.6	0.00	8.9	81.0	101	$10,490.01	$20,857.38
2010	17.3	29.4	0.00	0.00	25.9	51.4	124.0	$28,385.16	$17,555.35
2011	18.0	7.0	0.00	0.00	44.9	47.4	117.3	$22,996.46	$12,450.00
	1,327.9	**97.6**	**77.6**	**921.2**	**754.6**	**2,872.7**	**5,682.3**	**$1,515,568.03**	**$391,727.48**

vi. SRF Agriculture Loan Program

The State Revolving Fund Loan Program provides 3% loan financing for poultry and dairy producers to implement Best Management Practices (BMPs) on their farms to aid in the reduction of Nonpoint Source Pollution. This program helps poultry and dairy farmers finance their portion of conservation best management practices. Normally, cost-share will fund approximately 75% of the cost of the practice, and the farmer can finance the remaining balance at 3% interest. These payments are taken directly out of their flock or milk checks. Since the inception of the program loans have totaled over $ 6.4 million for poultry producers and $ 900,739 for dairy producers.

2011 Highlights:

- The State Revolving Loan Fund assisted landowners in implementing BMPs. Nearly $51,520.00 in loans were processed in 2011 providing a low interest loan for the construction of certain conservation practices and BMP installation.

In 2011, producers received SRF funding for the following BMPs:

Poultry BMPs	Number	Amount
Manure storage structures	2	$ 23,665
Poultry carcass composters	1	$ 2,306
Dead bird incinerators	0	0
Front-end loaders	1	$ 12,600
Calibratable spinner manure spreaders	1	$ 8,800
Heavy use area protection pads	13	$4,149
Dairy BMPs		
Dairy waste management system	0	0

Eligible practices for poultry loans include:

- Manure storage structures
- Poultry carcass composters
- Dead bird incinerators (with permit)
- Front-end loaders and bucket attachments to facilitate dead bird composting
- Calibratable spinner manure spreaders
- Heavy use area protection pads
- Poultry Windbreaks

Eligible practices for dairy loans include:

- Dairy waste management systems
- Liquid manure application, transfer, and agitating equipment
- Front-end loaders
- Manure spreaders
- Irrigation equipment for spray irrigating animal waste

vi. Wetland & Stream Restoration Projects

Education & Outreach:
Tom Barthelmeh coordinated and assisted Amy Jacobs with presentations concerning wetland and channel restoration at the following functions:

- University of Delaware's Poultry Production and Nutrient Management Continuing Education Program – 4/7/11 (Georgetown- Carvel Research and Education Center) There were approximately 125 individuals present.

- Nutrient Management/Pest Management class held at Laurel American Legion. This class was hosted by Hudson Consulting, Inc. on February 8, 2011. There were approximately 150 farmers present.

The Wetland and Channel Restoration Display was taken to the State Fairgrounds as part of Delaware Agriculture Week (January 18-21). The display was manned all week primarily by staff from the Watershed Assessment Section. The main purpose was to promote restoration in the Nanticoke Watershed. During the event Andy Howard (Watershed Assessment) was interviewed and filmed by WBOC TV.

On March 4, 2011, Tom Barthelmeh held a full-day Restoration Tour throughout Kent County. The participants were Eileen McLellan (Environmental Defense Fund), Josh Thompson (Sassafras River Association), and Sara Esposito (DNREC's Sediment and Stormwater Program).

On April 14, 2011, Tom Barthelmeh participated in the Phillis Wheatley Middle School's Science and Math Night. Tom and several students built a model of a farm/wetland ecosystem utilizing a 2 foot x 2 foot sand box. The model included a crop field, pasture with animals, channel with floodplain and low flow channel, forested area, hedgerow, wetland with microtopography, coarse woody debris, organic matter, turtle and frogs, etc. Tom explained the model to students as they stopped at his station, especially noting the functions and values of wetland especially for water quality benefits. The model was well received by the hundreds of students, parents and teachers.

On March 29, 2011, Tom Barthelmeh held the Wetlands Restoration Construction Techniques Workshop at the Phillis Wheatley Middle School in Bridgeville. The workshop included a hands-on session that gave participants the opportunity to apply and understand numerous wetland construction techniques and best management practices through the construction of small scale models that simulated full-scale wetland restoration projects. The workshop was held for 20 students of the school's Conservation Club and 4-H members.

On March 17, 2011, staff from the Delaware National Estuarine Research Reserve's (DNERR) Coastal Training Program held the Wetlands Restoration Construction Techniques Workshop in partnership with the Drainage and Stormwater Section at the Reserve's St. Jones site. The workshop included a hand-on session that gave participants the opportunity to apply and

understand numerous wetlands construction techniques and best management practices through the construction of small scale models that simulated full-scale wetland restoration projects. The workshop was attended by approximately 40 participants from non-profit organizations, state agencies, county government and private contracting companies. DNERR staffer Kelly Wolfe facilitated the workshop and the keynote presentation on wetlands restoration was given by Tom Barthelmeh, Drainage and Stormwater Section, with assistance from Al Rizzo, U.S. Fish and Wildlife Service.

Project Status and Upadates:
The status of the following restoration projects is listed below:

Webber Farms
The Webber Wetland Restoration Project (located southwest of Smyrna) was constructed by the Kent Conservation District with planning, design, inspection and construction layout from DNREC's Drainage Program, Ecological Restoration Program and the Kent Conservation District. The purpose of the project is to demonstrate methods to improve the water quality of surface water runoff from poultry production areas and adjacent agricultural fields. The plan involved constructing a wetland treatment system in an agricultural field approximately one acre in size. This project is a great example of the work we've been promoting for the last few years in partnership with the Department of Agriculture and the agricultural community to improve the water quality of agricultural runoff. This project consists of constructing a 1 acre wetland with a water control structure to filter a production area with 6 poultry houses, supportive structures and 55 acres of cropland. This project complements former Tax Ditch and Wetland Restoration Projects on the Webber Farm involving 3 water control structures, 2 acres of wetlands and a diversion tile from the tax ditches into the wetland. This project is a good example of "Whole Farm Water Management". On November 17, 2011, the Smyrna High School FFA Club held a planting on the Webber Project. Approximately 12 students, their teacher and the Webbers planted 70 trees (5 gallon pots) and 400 plugs and tublings (sedges, rushes and grasses). The planting was very successful despite a cold rainy day.

University of Delaware – Stroud Pasture

This wetland restoration project (½ acre in size) was constructed in a cow pasture on the north side of Farm Lane at the University of Delaware Agricultural Complex. This low area of the pasture was always disturbed by foot traffic from cattle which resulted in it being very wet. This portion of the pasture was excavated into a permanent wetland which has been fenced and will no longer be utilized as a pasture. The spoil from the excavation was used to re-grade other areas of the pasture. This project is an excellent example of land which should not be cultivated or pastured and was restored to what it was trying to become while the remaining pasture was improved through regarding.

Schwartz Property
This project involves constructing a 2 acre wetland in a marginal agricultural field located on a National Historic Landmark called Aspendale. The design, Project Agreement, and Purchase Order are complete. Construction is planned for this spring, or summer.

Dashiell Tract This project, located east of Laurel, involves installing a water control structure in the L&W Tax Ditch. The structure will be a 36" pipe with a 54" flashboard riser and will back water up for approximately 3,500 feet. It also involves re-establishing the non-maintained tax ditch access way to allow tax ditch maintenance while preserving canopy and shade by keeping as many trees as possible.

Haines Ditch
This project involves constructing 2 wetland cells at the Haines Farm (Fish and Wildlife) near Willow Grove. The 2 cells will be constructed in an existing "V" ditch and grass buffer. Ag runoff will filter through these wetland cells before it enters an existing restored wetland.

Arvery Road This project located southeast of Laurel, involves a small drainage channel in an agricultural field. The plan will feature establishing a floodplain (approximately 15' wide) and a small sinous low flow channel (approximately 2' wide). This project will result in establishing an excellent demonstration site in this portion of the county.

Blackbird
This project involves wetland restoration around the field edges to protect steep slopes flowing into the valley channels as well as one area in a flat field on the northwest corner of the property. This project also includes the stabilization of approximately 500' of a severely eroded wooded area which washes out a portion of the lane during storms. A survey has been completed and the project is in the design phase. Construction is expected this summer.

vii. Stream & Riparian Corridor Enhancement Program

Projects Updates:
The following section briefly describes restoration projects that have been completed in 2010 by the Division of Watershed Stewardship Stream Restoration Program. Restoration activities have included stream restoration, wetland restoration, shoreline stabilization, the planting of warm- and cool-season grasses, reforestation, riparian corridor planting, and invasive species control. These projects were primarily funded by the Nonpoint Source Program.

Dover Silver Lake Park

The Dover Silver Lake restoration project involves the stabilization of 400 linear feet of stream bank along the St. Jones River where it flows through the City of Dover's Silver Lake Park. Additionally, a regenerative stormwater conveyance system will be installed to treat stormwater before it drains into the tidal St. Jones River.

A Nationwide Permit #13 for stream bank stabilization was issued by the U.S. Army Corps of Engineers and a Subaqueous Lands Permit was issued by the Delaware Department of Natural Resources and Environmental Control for the Dover Silver Lake project.

A project agreement between landowners has been reviewed. It was determined that a boundary line issue exists between the property owners in the area of the stormwater ditch where the regenerative stormwater conveyance system will be located. A boundary line survey will be done in January 2012; the Project agreement will be executed following the survey.

An Invitation to Bid process was conducted which involved the submission of prequalification criteria by interested construction firms. Submittals were evaluated and qualified vendors were invited to attend a mandatory onsite pre-bid meeting. Bids were received and a vendor was selected in late November. Construction will begin in January 2012.

Ham Run Stream Restoration Site

The Ham Run stream restoration project involves a 400 – 500 feet reach of Ham Run, a tributary to Red Clay Creek near the intersection of Duncan Road and Greenbank Road. JMT Environmental finalized the design plans and permits have been issued by the U. S. Army Corps of Engineers and the Department of Natural Resources' Wetlands and Subaqueous Lands Section. This project is being funded by DNREC's Community Involvement Advisory Council, DelDOT and the EPA Nonpoint Source Program. A Project Agreement is currently under review by DelDOT which will stipulate the amount of funding that they will direct toward the construction phase. It is anticipated that construction of this will occur in the fall 2012.

Hickory Spring Road

Final design plans were completed and permits were issued by the U.S. Army Corps of Engineers and DNREC's Subaqueous Lands Section. Property owner received cost-share funding from the New Castle Conservation District. Additional funding was provided by the NPS Program. A vendor was selected and the project was completed in the spring of 2011. The stream channel was separated from an in-line pond (i.e., a stream that has been dammed to create a pond). The stream channel now bypasses the pond. Sediment was removed to increase the depth of the pond.

DelCastle Technical High School

Representatives from DNREC's Division of Watershed Stewardship and the USDA- Natural Resources Conservation Service (NRCS) met with Delcastle Technical High School faculty members and discussed a potential stream and wetland habitat restoration project on the school property located along Hershey Run near Marshallton. The school personnel expressed an interest in ways to enhance the quality of the habitat in the area and promote Green Technology.

DNREC and the NRCS made several recommendations and agreed to assist with the following: site survey; invasive species plant control; creating a buffer (total of 2.5 acres) on each side of the stream and plant with native trees, shrubs and warm-season grasses; development of educational signs; and creation of a new bridge to allow better access. The goal is to have the students work on as much of the project as possible (e.g., developing the design plans, controlling invasive species, planting of trees and shrubs, signage, etc.). DNREC and USDA-NRCS staff helped DelCastle's staff and students to procure additional grant funding from the Partnership for the Delaware Estuary towards the project to be implemented in 2012.

Upper Christina (West Branch)
Approximately 3,000 linear feet of the upper Christina River west of Newark will be restored using a variety of restoration techniques. The goals will be to establish stream-side buffers, restore bank stability, reduce in-stream sediment loading, reconnect stream with floodplain, improve water quality and provide wildlife habitat.

A Request for Qualifications/Letter of Interest professional services vendor selection process was conducted and a design contractor has been selected. Contracting procedures are underway. Additionally, a $30,000 grant application submitted to the State of Delaware's Clean Water Advisory Council was approved and will be match with funds from the Nonpoint Scout Grant ($30,000 from FY '08). As part of this grant application, the City of Newark and the University of Delaware have agreed to assist with the public outreach components related to this project. State Representative Terry Schooley has committed $50,000 toward the construction phase. It is anticipated that design plans will be completed by August 2012.

ix. Pollution Control Strategies – 2011 Project Implementation

This section details the activities that occurred in the prioritized watersheds of Delaware during the 2010 calendar year. Many of the activities were targeted by the Tributary Action Teams (TAT) formed to draft and implement the Pollution Control Strategies (PCS) being developed in response to the adopted total maximum daily loads. Funding of many *2010 Highlights* below is made possible through NPS Program funding provided to DNRECs Watershed Assessment Section.

PCS History:
A 1997 federal court case required Delaware to set pollution limits, or Total Maximum Daily Loads (TMDLs) for our waterways. Setting pollution limits is just the first step toward improving water quality. The next important step is the development of pollution control or reduction strategies. To develop these strategies, Delaware formed Tributary Action Teams (TATs) and tasked them with the specific responsibility of drafting formal documents titled, *Pollution Control Strategies*, which are watershed specific and include numerous ways to reduce pollution levels. The Pollution Control Strategy (PCS) includes a combination of more than one pollution-reducing method. The PCS objectives are to:

- Assist implementation of structural Best Management Practices (BMPs) in TMDL watersheds based on preliminary findings and recommendations of the Whole Basin Teams assigned by the Department of Natural Resources and Environmental Control (DNREC) for agricultural and urban activities;
- Implement projects to support the development of TMDLs and accomplish objectives and milestones in Delaware's NPS §319 Management Plan; and
- Determine watershed appropriate pollution control strategies for TMDL implementation.

a. Inland Bays Watershed

Pollution Control Strategy Implementation

To insure implementation of the Inland Bays Pollution Control Strategy, staff from DNREC's Divisions of Water Resources and Watershed Stewardship, as well as the Sussex Conservation District, routinely hold pre-application meetings for newly proposed development projects to discuss new stormwater management and buffer requirements. In addition, if proposed projects use onsite wastewater treatment and disposal systems, applicants are informed of new PCS requirements that may apply to those systems as well. Since the PCS regulation went into effect, six proposed projects were discussed at these pre-application meetings. These projects only cover 377 acres due to the economic downturn.

Buffers

If land is developed, the PCS requires buffers along primary and secondary water features. Buffers are NOT required on existing developed lands or lands used for agriculture. Buffers must be 100 feet wide on primary waters and 60 feet wide on secondary waters. Buffer width can be reduced if combined with other pollution reduction actions. Buffers will exist in community open space and will be managed by homeowners' associations. The PCS encourages planting buffers with trees and other native plants.

Wastewater

The PCS regulation prohibits cesspools and seepage pits, which are simple disposal systems, that discharge untreated wastewater into ground waters. In addition, properties being sold that use a septic system must have it pumped out and inspected prior to completion of sale in order to indicate whether the system is in working order. All septic systems must reduce their nitrogen content of the effluent. This requirement went into effect 60 days after the regulations were finalized in November 2008 for sites within 1000 feet of tidal waters of the Inland Bays and will become effective in all septic systems in the rest of the watershed by 2015. As of the middle of December 2010, 47 small septic systems have permits with nitrogen reducing devices which will reduce nitrogen concentration in the wastewater by 50%.

b. Appoquinimink Watershed

Pollution Control Strategy

On October 4, 2010, after ten years of deliberation, public discussion, and education, the Appoquinimink River Association submitted the Appoquinimink Pollution Control Strategy

(PCS) for final approval from the Department of Natural Resources and Environmental Control (DNREC). From working with DNREC over the past years, the Association believes that the document achieves the 2003 Total Maximum Daily Load required nonpoint source nutrient load reductions for the Appoquinimink River and its tributaries. The Appoquinimink River Association has been implementing these strategies for years. The PCS was modified so that it more clearly shows how the PCS meets EPA 319 Non-Point Source (NPS) A through I criteria for achieving TMDL load reductions. Full implementation of its elements within the PCS should lead to the achievement of the TMDLs for Total Nitrogen (TN) and Total Phosphorus (TP). Because of the lag time between seeing improvements in ground and surface water quality, estimated to be up to 30 years, improved water quality conditions will not be realized immediately. The Department will continue to monitor water quality, as will many citizen volunteers. The Department is committed to revisit this Pollution Control Strategy in 10 years to ensure that water quality is improving with implementation of the regulations and voluntary practices called for within this document.

Analysis using a basic land use loading rate model shows that as of November 2010, nonpoint sources of TN and TP have been reduced by 109% and 111%, respectively (Figure 1 and 2). Thus, voluntary programs for installation of agricultural best management practices have been extremely successful as well as the County's and local governments' efforts to protect open space and riparian buffers. Implementation of the Sediment and Stormwater Law has also led to decreases in nutrient loading, however, the full impact is not shown here because some sediment and stormwater practices, known to be in place, are not yet captured in a database and therefore, not considered in these calculations.

c. Broadkill Watershed

An important partner working toward increased water quality in the Broadkill Watershed is the Milton Community Foundation. Established in 2006, the Foundation is a charitable/educational tax-exempt 501(c)3 community based organization that works in partnership with other organizations and the Town of Milton to promote public/private partnerships, provide community based solutions and improvements and good governance, and enhanced civic services and economic development. One of the Foundation's specific goals is to support the improvement of the water quality of the Broadkill River, and protect its shoreline so the Broadkill River becomes fishable and swimmable, and to support other efforts that protect the volume and quality of groundwater in the Broadkill River watershed.

Using the Broadkill Watershed Assessment and Plan, the Milton Community Foundation and the Town of Milton submitted a grant request in January 2010 to the State of Delaware to address the much needed unpermitted and untreated stormwater discharges documented in the Milton area. The projects chosen would install rain gardens, install bioretention facilities, and buffer some areas of the Broadkill River in the Town Park.

Due to one potential retrofit site in Milton not wanting to be part of the grant, the potential projects had to be re-assessment for financial feasibility and practicality of doing the remaining site, some momentum was lost with the town and proposed partners. Two project sites were

thought to be doable with the funds requested from Clean Water Council Community grants H.O. Brittingham Elementary School (H.O.B. and Milton Public Library (county owned) were chosen because both are excellent locations for community outreach, publicly accessible demonstration sites, and support from the Milton community for maintenance.

After meeting with personnel, the Cape Henlopen School Board unanimously supported the H.O.B. project and County Engineering and Head Librarian for Milton Library also support the project.

Since Duffield Associates, Inc has well regarded engineering/design expertise and Environmental Concern, Inc has strong experience with developing schoolyard habitats and involving students and maintains a native plant nursery, the two firms decided to combined their expertise and submit one project proposal. A follow up meeting at Duffield Georgetown office with two potential contractors developed an agreement in principal. Duffield Associates, with input from ECI and Sussex Conservation District, gave presentation with detailed conceptual design, at Milton Community Foundation January 2011 meeting. Milton Community Foundation Board unanimously approved the combined proposal to do H.O.B. (Two areas – circle and in front by the school sign) and Milton Library (two areas – on side of bldg. and grass area adjacent Broadkill River). Duffield proposed to do a design/build and serve as project manager with ECI and Sussex Conservation District as subcontractors. Duffield Associates wants to have the project built and planted by mid- spring 2011.

In addition, Guided Path Design is designing and planning a riparian buffer around the Town Park in Milton.

d. Christina Watershed

The Christina Pollution Control Strategy was submitted into the Department in November 2007. The Christina PCS was written to meet EPA's 319 NPS program "A through I" criteria. Presently, the PCS is being updated to include new agricultural acreage numbers, as well as incorporating new habitat TMDL information for the Christina watershed.

Delaware's Piedmont Basin includes 58 segments that are identified as Category 5 (i.e., the 303(d) list) waters of the state's 2008 Integrated Report as impaired for habitat and/or biology. The impaired segments, originally listed in 1998, are located throughout the Christina River, Brandywine Creek, Red Clay Creek, White Clay Creek, Naamans Creek and Shellpot Creek watersheds.

Tetra Tech, Inc., through an agreement with DNREC and EPA Region 3, developed a project with the goals to review, compile, and evaluate available information on current impairments in Delaware's Piedmont Basin to determine appropriate options, including restoration activities for addressing the listed habitat/biology impairments within the Basin. The first task focused on identifying restoration activities that have been implemented within these watersheds, and the second task focused on reviewing information on restoration activities to evaluate their potential to restore impaired water bodies and attain water quality standards. Much of the work directly supports several habitat recommendations within the PCS, including:

- Increase Urban Tree Canopy
- Protect Existing Wooded/Vegetated Open Space Areas
- Reforest Watersheds and Headwaters

Tetra tech, Inc. submitted the report "Assessment of Biology and habitat Impairments in Delaware's Piedmont Basin." The report's findings are being incorporated into the updated PCS.

e. Mispillion and Cedar Creek Watershed

The Mispillion Tributary Action Team (TAT) completed their pollution control strategy recommendations for the Greater Mispillion Watershed (Mispillion River and Cedar Creek). After some minor editing, the TAT submitted their recommendations to the DNREC Secretary in early August 2010. The TAT believes their pollution control strategy recommendations will achieve the nutrient and bacteria reductions needed to meet the Mispillion River and Cedar Creek Total Maximum Daily Loads (TMDLs) as set by EPA. Their recommendations to reduce nutrients flowing into the Greater Mispillion Watershed can be grouped into three main categories:

- Reducing nutrients from developed land (existing and future)
- Provide incentives for additional nutrient reductions from agriculture;
- Education

Recommendations which received an average priority ranking of 4 or greater on a scale of 1 to 5 by the TAT are identified as High Priority within the recommendations. In addition, the TAT recommended the creation of a watershed association to maintain and increase public participation in improving the quality of the watershed. They want the watershed association to be a non-profit organization engaged in activities to preserve, protect and enhance rivers and related natural resources. The team believes that with a strong identification of the community with the river, that there would be a significant interest in participation in a watershed association. An established association would be beneficial in publicizing and conducting educational programs that raise awareness and help improve water quality in the Greater Mispillion watershed. To date no progress has been made on the Greater Mispillion pollution control strategy nor the development of a watershed association.

f. Murderkill Watershed

The Pollution Control Strategy for the Murderkill is drafted and has incorporated new buffer recommendations based on a recent analysis. The document is edited and is being reviewed for compliance with EPA's "A through I" criteria. Cost estimates need to be finalized in the PCS as well as revising the agricultural BMP data.

g. St. Jones Watershed

St Jones Restoration

The St Jones PCS is written, it addressed EPA's "A through I" criteria and incorporates the results of a new buffer analysis and the City of Dover's recently updated riparian buffer ordinance. The PCS also needs to finalize the financial analysis and revised Dover Silver Lake Park Stream Restoration Site. Design consultant services were secured from Biohabitats, Inc. to prepare plans for a regenerative stormwater conveyance system for the City of Dover's Washington Street drainage area and to restore approximately 320 feet of stream bank along the St. Jones River below the spillway at Dover's Silver Lake Park. Biohabitats submitted the 100% draft design plans and cost estimate and the permitting process was initiated to secure an Army Corps of Engineers Nationwide Permit #13 and a DNREC Subaqueous Lands Permit. In accordance with the Regional Conditions preconstruction notification process, letters were sent to the U.S. Fish and Wildlife Service, the National Marine Fisheries, the State Historic Preservation Office, the State Heritage Program, the State Subaqueous Lands Section, and the State Coastal Management Program. Following receipt of comments from these agencies, permit applications were submitted.

Upon reviewing the permit application, the Army Corps requested on-site meetings to discuss certain aspects of the proposed design plans. As a result of the on-site meetings, Biohabitats was requested to make revisions to the design plans. The 100% design plans were received in late December from Biohabitats and were forwarded to the permitting agencies (DNREC and the Army Corps of Engineers). It is anticipated that construction will take place in the first quarter of 2011.

Education and outreach:

The Silver Lake Watershed Coordinator accomplished:

1. Rain Gardens for the Bays campaign- coordinated the campaign launch event at the Delaware Agricultural Museum on behalf of the committee and worked with DNREC Public Affairs staff to develop the event agenda, press release, and proclamation, talking points for the guest speakers, outreach materials, and event logistics. Guest speakers included Delaware Governor Jack Markell, DNREC Secretary Collin O'Mara, EPA Region III Deputy Administrator Bill Early, Director of the Partnership for the Delaware Estuary Jennifer Adkins, Director of the Center for the Inland Bays Ed Lewandowski, and Clean Water Advisory Council Vice Chairman Jeffrey Bross.

2. Completed the water quality improvement projects at the Delaware Agricultural Museum with costs under budget. Which include:

    a. Planting a vegetated buffer around the severely eroded and nutrient and bacteria laden pond through coordination with students from Polytech High School's Environmental Science Education program. Floating wetlands were also launched into the pond to reduce excess nutrients through root uptake. Results from water quality sampling pre- and post- wetlands launch will help determine the effectiveness of the floating wetlands. This project was the first of its kind in Delaware.
    b. Coordinated the design, landscape, and construction of two rain gardens to capture roof runoff from the main educational building and the conversion of a dry pond to bioretention facility that will capture parking lot runoff in addition to a curb-cut that will allow highway runoff to enter the facility.
    c. We intend to use the additional funds to expand our water quality improvement projects on the property to include a Biosock filter placed at the entrance of a stormwater inlet that leads to the stormwater pond and exclusion fencing to keep Canada geese from degrading the property and contributing to the pollution load. We will also create educational signage for the projects as the Delaware Agricultural Museum where more than 500,000 visitors have toured the facility since its opening.

3. Sub-watershed Implementation Strategy: Starting the process to develop a sub-watershed strategy, in conjunction with the City of Dover and the Silver Lake Commission, to serve as a resource of priority projects to improve water quality in the St Jones watershed.

4. Attended design and planning meetings for phase two of the Silver Lake Revitalization Plan with DNREC staff, Army Corps of Engineers, and Biohabitats Inc. and kept the City of Dover and Silver Lake Commission abreast on new developments of this project.

5. Facilitated meetings between DNREC and the City of Dover to address a failing low-head dam structure in the St Jones River. Coordinating with the City, DNREC, and Silver Lake Commission to have the structure removed.

6. Dover Fun Ride and Stride on National Trails Day (June 5, 2010)—this event was a platform to raise awareness about the public trails in the Dover area that are underutilized by nearby residents. This was the first year for the event that coincided with National Trails Day and generated dozens of participants and publicity about local trails.

7. Dover High School stormwater improvements are moving forward with the approval from the Principal and cooperation from Grounds and Maintenance staff and science education teachers. Teachers are interested in propagating rain garden plants and using the future rain gardens as education tools.

8. Participation in the City of Dover's Environmental Ordinance revisions and the Development Advisory Committee.

9. Education and outreach: Participated in the Delaware State Fair, Delaware Coast Day, and conducted an interview with WBOC-TV 16 that aired on September 22 and promoted the rain gardens at the Agricultural Museum, the Rain Gardens for the Bays campaign, and environmental stewardship in regard to stormwater pollution. Provided educational presentations to children at the Dover public library, active environmental stewards of the Delaware chapter of the Sierra Club, and nursery and landscape professionals and companies at the annual Summer Expo hosted by the Delaware Nursery and Landscape Association.

10. Received training for certification as a Rain Garden Specialist and Trainer by Rutgers University and training in the use of Social Media.

11. Gained valuable experience in coordinating the creation of a rain garden at East Coast Garden Center in Millsboro, DE.

x. Delaware Rain Barrel Program

The Nonpoint Source Program has implemented a very successful statewide rain barrel program. Since the inception of the program in 2008, approximately 1,800 barrels have been distributed statewide. The program was

unique in that the barrels retailed for $120 but were purchased at a bulk discount price of $66.00 and sold to residents for the same price. The program did not cost the state any money but provided water quality and conservation benefits while providing a substantial savings to Delaware residents.

In 2011, the NPS program implemented its fourth annual statewide rain barrel distribution. One hundred barrels were earmarked for each of the three counties and the distribution was scheduled from 10 a.m.-7 p.m. The program was so successful that all 300 barrels were sold out in just one hour. A fifth rain barrel distribution is scheduled for May 2012.

xi. Community Water Quality Improvement Grant Program

The purpose of the Community Water Quality Improvement Grant Program (CWQIGP) is to provide financial assistance to eligible entities to facilitate projects that will support water quality improvement in impaired Delaware watersheds. The CWQIGP is administered by DNREC, Division of Water Resources and managed by the Nonpoint Source Program. The goals of the program are to support projects that focus on the developed landscape that will help to improve water quality and address one or more of the following goals:

- Provide benefits to water quality within an impaired watershed
- Implement non-regulatory projects in a watershed management plan
- Installation of community stormwater management improvements in existing developments and municipalities
- Collection of federally acceptable quality controlled water quality data by volunteers
- Restoration of water quality benefits

In December 2009, the program solicited requests for proposals and nineteen were received; however, due to limited funding a ranking committee was established and the following seven projects were funded:

Milton Community Foundation

The watershed plan is comprised of three components. The first component is a baseline assessment, which identifies and describes the watershed, sources and types of impairments, and locations of water quality degradation. The second component is an inventory of potential pollution control opportunities targeted at the identified impairments. The third component is the implementation strategy, which combines the data from the first two components and then prioritizes the watershed management methods to ultimately reduce pollution entering the watershed. The main objective of this project is to implement pollution prevention and mitigation stormwater practices within the Broadkill watershed and to develop competence within the Town of Milton to manage their own stormwater and other nonpoint source pollutants. The following projects will be completed:

- Retrofit a dry pond into a rain garden and schoolyard habitat to support curricula at the H.O. Brittingham Elementary School in Milton.
- Create several rain gardens near the Milton Public library to treat rooftop runoff.

Partnership for the Delaware Estuary

Stormwater runoff is a growing concern in Delaware. With much of the state's open lands being developed, more storm water is running off impervious surfaces and into our waterways than ever before. This storm water runoff carries pollutants from impervious surfaces into our streams. In response, the Partnership for the Delaware Estuary (PDE) will install 3 rain gardens at locations in the St. Jones Watershed, and in Delaware's capital city of Dover.

Project sites will include the Natural Resource Conservation Service (NRCS) office park, the North Dover Elementary School, and a third school-site location to be determined. The installation of these rain gardens will improve water quality in the St. Jones, an impaired watershed within the Delaware Estuary.

Delaware Agricultural Museum-Dover's Silver Lake (See Project Highlight Below)

The Puncheon Run Floodplain/ Kent Conservation District

The Puncheon Run is a tributary of the St. Jones River that drains approximately 2,200 acres from the west and south sides of the City of Dover. The stream has been negatively impacted by past urban development. The natural floodplain has been eliminated because of the historical grading and filling on the south side of the stream near Lynnhaven Drive and Governors Avenue and has introduced numerous sharp bends, restricting flow. The result is increased water elevations upstream due to the channel restrictions and loss of the natural stream bank.

The following objectives will be accomplished:

- Restoration of Impacted floodplain
- Water quality treatment of urban runoff

This project proposes to restore a portion of the lost floodplain west of South Governor's Avenue and to provide for water quality treatment of stormwater from 3 existing communities .It is proposed to restore the portion of the floodplain at the corner of Governors Avenue and Lynnhaven Drive by creating a broad overflow area with a meandering channel on the north side of the stream. The project will intercept an existing ditch draining the older community of Woodbrook. The flow from Woodbrook will be filtered through a constructed stormwater wetland within the overflow area. Water quality features are also proposed for the communities of Crossgates and Mayfair by excavating an existing drainage pipe and installing open bio-filtration water quality features.

Rosetree Hunt Storm water Pond Renovation/NC Conservation District

As part of the New Castle County Office (NCC) of Community Governing Storm water Amnesty Program the Rosetree Hunt Maintenance Association (RHMA) was included in the voluntary NCC program that provided much needed financial and technical assistance with major storm water pond repairs. These repairs and improvements will bring the RHMA storm water pond into compliance with DNREC's Sediment and Storm water Regulations and DNREC's NPDES

permit for storm water that was issued to New Castle County. Funding for facilities covered by the NCC Amnesty Program was provided to New Castle County by the State of Delaware.

The following objectives will be accomplished:

- Upgrade the Rosetree Hunt stormwater management pond so that it exceeds the requirements of the DNREC's Sediment and Stormwater Regulations and DNREC's pending NPDES permit for stormwater management in New Castle County.
- Removing excess sediments that have accumulated in the forebays, low-flow channel, and in front of the inlet pipe(s).
- Repairing and restoring the eroding embankment that surrounds the pond;
- Replacing the existing outlet structure and existing inlet pipes;
- Re-establishing and reconstructing the low-flow channel to the design depth to increase retention time and contact area;
- Replacing and repairing riprap as needed;
- Removing dead and volunteer vegetation from the emergency spillway;
- Designing and constructing water quality improvement practices to reduce sediments, nutrients, and/or bacteria. Practices being considered include, but are not limited to:
    - Redesigning and constructing forebay(s) to control sediments;
    - Reconfiguring the low-flow channel by constructing micro-pools, bioretention areas and/or shallow pools to enhance nutrient removal and reduce bacteria levels due to microbial growth; and
    - Planting wetland vegetation to uptake water soluble nutrients.
- Depending on available funding, NCCD will work with the DNREC to contract with a qualified contractor or NGO to collect and analyze wet-weather water quality data that meets DNREC's data quality requirements.

Anchorage Canal Drainage Area Storm water Retrofit Project /Center for the Inland Bays

The Little Assawoman Bay (LAB) is impaired by excess nutrients and regularly violates primary contact recreation and instantaneous dissolved oxygen criteria. The excess nutrients have resulted in murky waters that prohibit growth of submerged aquatic grasses, and low dissolved oxygen levels have further degraded habitat for fish and benthic animals. In 2008, the Inland Bays Pollution Control Strategy (PCS) was promulgated to guide the reduction of nitrogen and phosphorus loads by the 40% necessary to meet the watershed's 2004 TMDL. The PCS has as one if its actions the voluntary "[Creation] of storm water management facilities and source reduction strategies for 4,500 acres of urban and residential lands developed pre-1990," which is to be implemented by DNREC, DELDOT, Sussex County, and the Sussex Conservation District.

The project will implement the following strategies:

- Retrofit an existing ditch within the DelDOT right of way adjacent to the Sea Colony high-rise complex.

- Convert an existing ditch to a wet swale with a sediment control forebay, check dams, and vegetated filter strips to incrementally improve treatment of runoff from residences, businesses, roads, and a large area of the Sea Colony parking lot. The Town of South Bethany's monitoring committee will measure anticipated changes in nutrients and dissolved oxygen concentrations within the Canal by continuing its program of continuous and spot-sample data collection. This data meets federal standards for citizen monitoring through EPA approved QA plans through the CIB and the University of Delaware Citizen's Monitoring Program.
- Archieve significant public outreach and have continued community cooperation and informal education on stormwater impacts and treatment.

Cool Run Watershed/ White Clay Cree/UD

White Clay Creek and its tributaries are listed by the US EPA as impaired waters for nutrients, dissolved oxygen, bacteria, and sediments. Cool Run, a tributary of White Clay Creek with headwaters on the University of Delaware's main campus in Newark, has long been impacted by nonpoint source pollution from urban, industrial, and agricultural sources (Fig. 1a). Two tributaries of Cool Run draining the University's main campus and some residential areas, and another tributary draining the University's Newark Farm converge at a pond behind a storm water weir on the farm. Downstream of the pond, another tributary enters Cool Run from a residential area that was a historical industrial site. Cool Run discharges into White Clay Creek 2.5 miles downstream of University lands. The Cool Run is in the White Clay Creek Wild and Scenic Watershed, the first wild and scenic river in the USA designated on a watershed basis rather than a river segment basis. The University campus is one of only two land grant institutions in the U.S. that have a wild and scenic river flowing through them. White Clay Creek discharges to the Christina River; projects identified in this proposal will meet the recommendations of the Christina Basin Pollution Control Strategy required by the EPA Clean Water Act TMDL.

The UD WATER project team, after discussion of pollutant loads from different land uses in the 9 sub-watersheds, developed the following preliminary recommendations to reduce total pollutant loads to the Cool Run tributaries of the White Clay Creek:

1) Increase the number and acreage of bio-retention ponds, grassed swales, and wetlands throughout the watershed, targeting them to areas of greatest TSS and nutrient loading
2) Install filter strips, vegetated buffers and other BMPs along streets and parking lots
3) Minimize stream bank erosion by targeted stream restoration projects focused on the Cool Run tributaries passing through the agricultural land on the UD Newark farm
4) Conduct stream monitoring to evaluate the impact of installed BMPs and verify USEPA event mean concentration values used to calculate loads from different land use categories
5) Conduct a UD and City of Newark educational program that promotes wider implementation of BMPs by the University, commercial operations, and residents in the watershed

Subsequent funding is planned for the implementation of additional water quality projects for 2011.

xii. Rain Gardens for the Bays

The Rain Gardens for the Bays program is a regional initiative that encourages citizens to create rain gardens where they work, live and play. The Rain Gardens for the Bays campaign had a successful year in 2011. The 319 funded campaign installed a total of 6 rain gardens throughout Delaware. Each county received two brand new rain gardens within the 2011 calendar year. Most of the rain gardens were completed under budget and leveraged funds from partner organizations. Almost all the rain gardens installed were completed with help from volunteers and/or staff associated with each facility. In addition to the public rain gardens funded by the campaign, numerous private residents and/or organizations registered their rain gardens online using the campaign website www.raingardensforthebays.com and received a sign to display near their rain garden to indicate their participation in the Rain Gardens for the Bays campaign. A total of 42 rain gardens are currently registered with the campaign with more in the queue that are completed and still need to be registered.

In conjunction with Delaware's DNERR Coastal Training Program and Rutgers Cooperative Extension's Water Resources program, the campaign conducted two rain garden installation trainings for the public. These one day events, held twice at 2 separate locations, were well received by everyone involved. Participants spent half the day in lecture and the second half physically planting a recently constructed rain garden and implementing newly learned skills through a hands-on activity planning and designing rain gardens in groups. In all, approximately 50 people participated in the two trainings. The campaign is looking into conducting more trainings in the 2012 year.

DNERR rain garden before planting, March

Several campaign committee members conducted public outreach for Rain Gardens for the Bays using newly produced tabletop displays. Events attended include Wilmington earth day, coast day, National Low Impact Development conference, DNERR open house, NPS region 3 conference, and more. With such high demand for the tabletop display, 2 additional displays were created so each county could have a display readily available within the county they work in and each display tailored to showcase rain gardens installed within the respective counties. Additional post cards were ordered and dispersed to each county to disseminate during public events. The campaign also decided to create tri-fold brochures for dissemination to the public. The brochure provides more detailed information about rain gardens, resources for additional

information, campaign details, and contact information. The artwork for the brochure is also used in the approved interpretive sign for some of the public rain gardens. Maintaining consistency in language, graphics, and appearance were important factors when choosing to develop both the brochure and interpretive sign.

Rain garden at Blackbird State Forest Headquarters office after a rain storm. The garden was dry the next day.

VII. Load Reductions

In 2011, the Delaware NPS Program load reductions were calculated for many of the projects completed. Load reductions are calculated using guidance established during the Inland Bays Tributary Action Teams' development of the Inland Bays Pollution Control Strategy.

2011 Project Load Reductions by Project

Project	Nitrogen (lb)	Phosphorus (lb)	Sediment (ton)
Conservation Reserve Enhancement Program	4003	1320	1103
Kent Conservation District Planners	232,816	1,486	NA
Nutrient Management Relocation	48,310	5,128	NA
Sussex Conservation District Planners	4,855,217	7,179	NA
Total	**5,140,346**	**15,113**	**1103**

VIII. *Future Changes and Challenges*

Programmatic Changes

From 1989 to 1997, the NPS Program relied on the development and implementation of Best Management Practices, identification of key partners, establishing agreements for interagency cooperation and funding many successful education, protection and restoration projects. This early period of NPS management in Delaware served to foster a keen understanding of the value of collaboration, consensus and community involvement in water quality management.

From 1997 to the present, efforts were made to fund implementation programs or activities that address the priority NPS contaminant sources such as agriculture, forestry, urban runoff, hydro modification, land disposal and various other miscellaneous sources. Examples of past activities include funding Kent and Sussex County Conservation District planner positions, stream restoration, and septic system pump-out, repair and/or replacement. These activities were prioritized based upon contaminate category and tended to establish BMP implementation on a geographic wide scale throughout Delaware. This broad approach served to successfully educate various sectors of the positive outcomes from BMP implementation and fostered a high rate of acceptance within each of the respective implementation groups.

While these and similar projects are expected to continue, a prioritized approach will be established to assure NPS activities are focused in stream reach drainages with the highest potential for contaminant delisting and/or re-establishing designated uses. In short, Delaware's NPS focus will center on impaired waters of the state when applicable.

Using geospatial data coverage, areas of Delaware will be identified as high priority for NPS activities. This delineation will assist the NPS Program during the review and ranking of submitted annual 319 grant project proposals. Highest priority will be designated in impaired water drainages or sub-drainages that have the highest rate of NPS control BMPs, activities or projects. As EPA has mandated 319 Grant expenditures should be focused on impaired waters

with an approved Watershed Plan and/or a defined Pollution Control Strategy, assessment and establishment of priority drainages are scheduled first these areas or Delaware first.

Land Use Changes

Ed Ratledge, Director of the Center for Applied Demography and Survey Research at the University of Delaware says the number of acres of farmland is decreasing. Delaware had around 900,000 acres of farmland in 1920. Now we have about 580,000 acres in the state. Famland acres are projected to continue to decrease until we reach about 380,000 acres by 2030.

The NPS program must address land use changes and trends for the next five years and beyond. As water runs over the landscape it picks up pollutants. These pollutants are either discharged into surface waters through runoff or seep through the soils into groundwater. The polluted groundwater eventually gets into the surface waters. As the landscape changes, so too does the funding demands of the NPS Program. Because of this fact, looking at land use will give the NPS Program goals, objectives and funding needs in which to focus the various resources the NPS Program receives. Agriculture BMPs, historically, have given the NPS Program the biggest return of nutrient uptake per dollar spent.

Land Use Challenges

The trend of land use from agriculture to urban in the future could also mean a trend for the NPS program to spend more money on technologies and initiatives to reduce non-point source pollution. When land is developed nutrient loadings come from multiple sources, such as yard maintenance, wastewater disposal, stormwater runoff, soil erosion, and increases in impervious cover. Delaware is the 9th fastest growing state according to the U.S. Census Bureau. The fast rate of growth in Delaware means an increase in urban/residential areas. An increase in urban/residential areas nutrient loads from these land uses must be dealt with without relinquishing our efforts in agriculture.

VIII. List of Partner Organizations/Committee Members

The hard work and many hours of agency staff members, organization members and private individuals who have partnered with the NPS Program in 2010 to address, reduce, identify and/or measure NPS pollution in Delaware is greatly appreciated. This NPS pollution control and prevention program has been very active, well received and effective. It is a credit to our partners as they have cooperated in the face of many conflicts to make this program what it is today.

Al Rizzo	**U.S. Fish and Wildlife Service**	**Jim Cassidy**	**DNREC/Groundwater Discharges**
Alan Jones	**Governor's Council on Forestry**	**Jim Chaconas**	**DNREC/Wetlands & Subaqueous Lands**
Ann Marie Townshend	**Kent County Planning Office**	**Jim Short**	**DNREC/Solid Waste**
Austin Short	**Delaware Department of Agriculture/Forestry**	**Joe Farrell**	**University of Delaware, Sea Grant**
Betsy Frey	**DNREC/Air & Waste**	**Kathy Bunting-Howarth**	**DNREC/Water Resources**
Bill Rohrer	**Delaware Nutrient Management Program**	**Kim Finch**	**DNREC/Small Businesses Ombudsman**
Bob Coleman	**Delaware Nutrient Management Program**	**Kimberly Cole**	**DNREC/Delaware Coastal Program**
Bob Moore	**Delaware Department of Agriculture**	**Kip Foskey**	**Sussex Conservation District**
Bonnie Willis	**DNREC/Delaware Coastal Program**	**Laurie Janeka**	**New Castle Conservation District**
Brenda Zeiters	**DNREC/NPS Program**	**Lyle Jones**	**DNREC/Watershed Assessment**
Brian Hall	**State of Delaware Planning Office**	**Lynn Mangus**	**Farm Service Agency (State Office)**
Bud Malone	**University of Delaware, Cooperative Extension**	**Marianne Walch**	**DE Department of Transportation**
Carl Solberg	**Kent County**	**Mark Biddle**	**DNREC/Watershed Assessment**
Chuck Williams	**DNREC/Shoreline**	**Mark Hogan**	**DNREC/NPS Program**
Dale Churchey	**Delaware CREP Program**	**Mike Brown**	**DNREC/ District Operations**
Dave Chapman	**University of Delaware, Sea Grant**	**Jamie Rutherford**	**DNREC/Sediment & Stormwater**
Dave Hansen	**University of Delaware, Cooperative Extension**	**Randy Cole**	**DE Department of Transportation**
Dave Schepens	**DNREC/Groundwater Discharges**	**Ric Kautz**	**County Planning Offices**
Derby Walker	**University of Delaware, Cooperative Extension**	**Robert Baldwin**	**DNREC/Soil & Water Conservation**
E.J. Chalavala	**Center for the Inland Bays**	**Robert Palmer**	**DNREC/NPS Program**
Ed Lewandoski	**CIB Center for the Inland Bays**	**Rodney Morehart**	**Kent Conservation District**
Eric Beuhl	**Center for the Inland Bays**	**Sally Kepfer**	**NRCS (State Office)**
Frank Piorko	**DNREC/Sediment & Stormwater**	**Sam Myoda**	**DNREC/Watershed Assessment**
Glenn Gladders	**Delaware Department of Agriculture/Forestry**	**Sara Wosniak**	**Appoquinimink Watershed Coordinator**
Gordon Johnson	**University of Delaware, Cooperative Extension**	**Scott Blaier**	**DE Department of Agriculture**
Greg Moore	**DNREC/Fish&Wildlife**	**Sharon Webb**	**DNREC/ NPS Program**
Jen Walls	**DNREC/Office of the Secretary**	**Shelley Tovell**	**DNREC/Fish&Wildlife**
Jen Gochenauer	**Delaware Nature Society**	**Steve Ditmer**	**Glatfelter Pulp Wood Company**
Jen Nelson	**DNREC/NPS Program**	**Steve Williams**	**DNREC/Soil & Water Conservation**
Jerry Kauffman	**Water Resources Agency**	**Tim Garrahan**	**NRCS State Office**
Jessica Watson	**Sussex Conservation District**	**Tim Riley**	**Kent Conservation District**